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[KR/KR]; Mokdong Apt. 316-502, 903 Mok-dong,  
Yangcheon-gu, 158-753 Seoul (KR).

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(74) Agent: AN, Kook Chan; Hannuri Bldg., 219 Naeja-dong,  
Chongno-gu, 110-053 Seoul (KR).

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(71) Applicants (*for all designated States except US*):  
**E.I.DUPONT DE NEMOURS AND COMPANY**  
[US/US]; 1007 Market Street, Wilmington, DE 19898  
(US). **CHEON KYUNG CO., LTD.** [KR/KR]; 884  
Gwanyang-dong, Dongan-gu, 431-804 Anyang-si,  
Gyeonggi-do (KR).

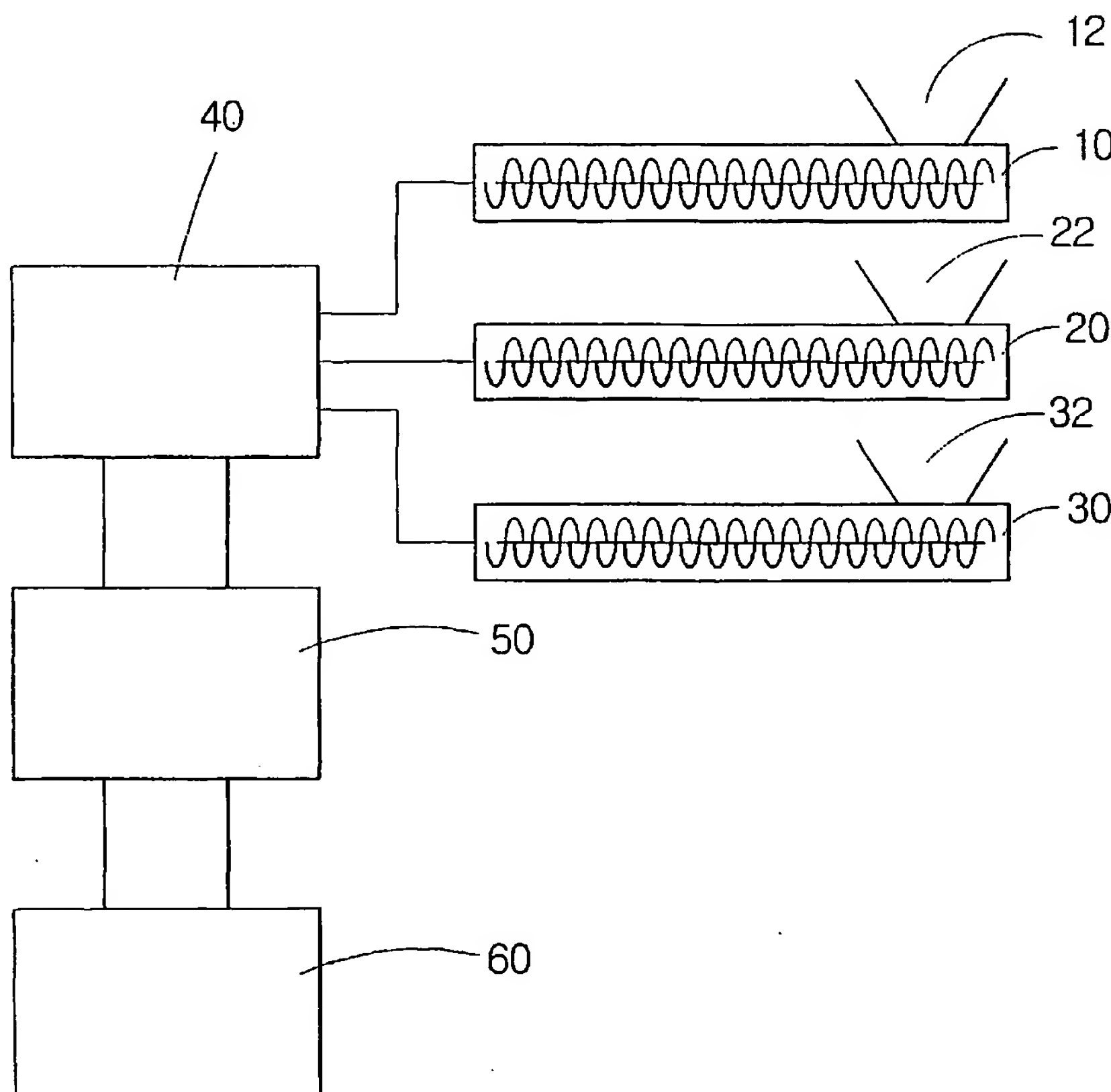
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(72) Inventor; and  
(75) Inventor/Applicant (*for US only*): **KWON, Hyuk Tark**

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(54) Title: CONTAINER HAVING A DOUBLE WALL STRUCTURE, MANUFACTURING METHOD AND APPARATUS THEREFOR

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(57) Abstract: ABSTRACT A container has a multi-layered wall structure which is composed of an inside layer made of opaque synthetic resin, e.g., polyethylene or polypropylene, and an outside layer made of transparent Surlyn resin and adhered to the inside layer, so that the container is light to handle, feels soft, has a high durability, and offers ornamental beauty. Raw materials of synthetic resin, Surlyn resin and adhesives are melted in cylinders 10, 20 and 30, respectively. The molten synthetic resin, Surlyn resin and adhesives are supplied into an extruder 50 separately from one another via a cylinder head 40, and extruded for forming the container 1 such that the molten synthetic resin forms an inside layer 2, the molten Surlyn resin forms an outside layer 3, and an adhesives layer 4 is disposed between the inside layer and the outside layer for bonding them together.



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## CONTAINER HAVING A DOUBLE WALL STRUCTURE, MANUFACTURING METHOD AND APPARATUS THEREFOR

### TECHNICAL FIELD

5           The present invention relates to a container having a multi-layered wall structure, wherein the wall is composed of an inside layer made of opaque synthetic resin, e.g., polyethylene or polypropylene, and an outside layer made of transparent Surlyn resin and adhered to the inside layer to form a multi-layered wall configuration, so that the container is light to handle, feels soft due to the Surlyn  
10 resin, has a high durability, and offers ornamental beauty as a glass container. The present invention also relates to manufacturing method and apparatus for manufacturing the container.

### BACKGROUND ART

15           Containers for keeping therein various kinds of contents are generally made of a variety of materials such as glass, synthetic resin, metal, and others. In case of the container for keeping cosmetics therein, glasses have been conventionally used as manufacturing material. However, manufacturing costs for glass containers are usually high. Moreover, the glass containers have other problems. It is easily  
20 breakable when handled without care, and it feels hard to the touch. For these reasons, synthetic resins, which are cheap, resilient, and have a high durability and a softer touch feeling than a glass container, have been widely used in recent years. Further, various research and development to manufacture a better container to increase its commercial values with such material have been tried.

25           However, the conventional synthetic resin containers have a single-layered wall structure. Some different designs were only possible by simply modifying their own shapes or making the wall transparent or opaque. Therefore, such conventional containers are simple in design, and just have a function of only containing goods therein.

30           Another type of conventional synthetic resin containers has a multi-layered wall structure. One example thereof is disclosed in Korean Patent Publication No. 98-87268, entitled "an insulated container having a dual-wall structure", which provides an improved insulating effect by providing a space between inside and outside walls. Another example is taught in Korean Utility Model Publication No.  
35 93-20841, entitled "a container having a dual-tube structure for cosmetics", which can expose other colors of cosmetics to the outside through its transparent wall.

However, transparency is lower than glass containers and the aesthetic quality of the container is low. None of the prior art teaches how to manufacture dual-wall structured container.

## 5     DISCLOSURE OF THE INVENTION

In view of foregoing, it is primary object of the present invention to provide a container having a multi-layered wall structure, wherein the wall structure is composed of an inside layer made of polyethylene or polypropylene synthetic resin which is opaque with its own color, and an outside layer made of transparent Surlyn  
10     resin having a soft touch, good wear-resisting characteristics with enhanced endurance and adhered to the inside layer to form a multi-layered wall configuration.

It is another object of the present invention to provide a light weighted container, which has soft touch feeling compared to the conventional glass container, while still providing a high quality appearance.

15     It is still another object of the present invention to provide a manufacturing method of the above container having a multi-layered wall structure.

It is a further object of the present invention to provide a manufacturing apparatus for the above container having a multi-layered wall structure.

In order to achieve the above objects, the present invention provides a  
20     container having a multi-layered wall structure, comprising an inside layer which is made of a synthetic resin selected from the group consisting of polyethylene and polypropylene, which is opaque and has a predetermined color; an outside layer which is made of a non-crystalline transparent Surlyn resin; and an adhesives layer which is disposed between the inside layer and the outside layer for bonding them  
25     together.

Further, in order to achieve the above objects, a manufacturing method of a container having a multi-layered wall structure comprises the steps of melting raw materials of synthetic resin, Surlyn resin and adhesives in cylinders, respectively; transforming the Surlyn resin to have non-crystalline and transparent features  
30     through the melting process; supplying the molten synthetic resin, Surlyn resin and adhesives separately from one another into a cylinder head and an extruder; and extruding the molten synthetic resin, Surlyn resin and adhesives for forming the container such that the molten synthetic resin forms an inside layer, the molten Surlyn resin forms an outside layer, and an adhesives layer is disposed between the  
35     inside layer and the outside layer for bonding them together.

Further, in order to achieve the above objects, a manufacturing apparatus for

a container having a multi-layered wall structure comprises cylinders which includes  
hoppers, through which raw materials of synthetic resin selected from the group  
consisting of polyethylene and polypropylene, Surlyn resin and adhesives are  
supplied into the cylinders, respectively, heating means for melting the raw materials,  
5 and feeding means for discharging the molten materials; a cylinder head for  
gathering the molten synthetic resin, Surlyn resin and adhesives discharged from the  
cylinders; an extruder which is mounted to the cylinder head, and includes a first  
extruding rod along which the molten synthetic resin flows down, a second extruding  
rod along which the molten adhesives flows down, a third extruding rod along which  
10 the molten Surlyn resin flows down, and a die for extruding the molten synthetic  
resin, adhesives and Surlyn resin such that the molten synthetic resin forms an inside  
layer, the molten Surlyn resin forms an outside layer and the molten adhesives is  
disposed between the molten synthetic resin and the molten Surlyn resin for bonding  
them together; and a molding device which includes a blowing device for forming  
15 the container with a multi-layered wall structure composed of the synthetic resin,  
adhesives and Surlyn resin extruded from the extruder.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Understanding that these drawings depict only typical embodiments of the  
20 invention and are, therefore, not to be considered limiting of its scope, the invention  
will be described with additional specificity and detail through use of the  
accompanying drawings in which:

Fig. 1 shows a process of manufacturing a container having a multi-layered  
wall structure in accordance with the present invention.

25 Fig. 2 is a schematic cross-sectional view of an extruder for forming a  
multi-layered wall structure.

Fig. 3 is a cross-sectional view showing a container having a multi-layered  
wall structure in accordance with the present invention.

#### 30 MODES OF CARRYING OUT THE INVENTION

It will be readily understood that the components and steps of the present  
invention, as generally described and illustrated in the Figures herein and  
accompanying text, could be arranged and designed in a wide variety of different  
configurations while still utilizing the inventive concept. Thus, the following more  
35 detailed description of the preferred embodiments of the system and method of the  
present invention, as represented in Figures 1 through 3 and accompanying text, is



not intended to limit the scope of the invention, as claimed, but it is merely representative of the presently preferred embodiments of the invention. The presently preferred embodiments of the invention will be best understood by reference to the drawings, wherein like parts or steps are designated by like numerals  
5 throughout.

Fig. 1 shows a process of manufacturing a container having a multi-layered wall structure in accordance with the present invention. Fig. 2 is a schematic cross-sectional view of an extruder for forming a multi-layered wall structure. Fig. 3 is a cross-sectional view showing a container having a multi-layered wall structure in  
10 accordance with the present invention.

As shown in Fig. 1, a raw material for general synthetic resin such as polyethylene or polypropylene, etc., crystalline raw material for Surlyn resin, such as materials produced by Dupont co., and raw material for adhesives are put into cylinders 10, 20 and 30 through hoppers 12, 22 and 32, respectively, and are melted  
15 in cylinders 10, 20 and 30 to be transferred.

Each cylinder 10, 20 or 30 includes a heating means (not shown) for melting each raw material to produce melted material with suitable temperature and a feeding means, e.g., screws, for discharging and transferring the melted material in one direction.

20 Even though the heating temperature in each cylinder 10, 20 or 30 is different from one another according to the working conditions, it is desirable that the heating temperature in cylinder 10 for melting the raw material of synthetic resin be in the range of about 150~180°C, and the heating temperature in cylinder 20 for melting the raw material of Surlyn resin is in the range of about 180~200°C.

25 Especially, the raw material for Surlyn resin originally has crystalline and opaque features. However, it is transformed to have non-crystalline and transparent features through the melting process in cylinder 20. Also, the Surlyn resin is well resistant to low temperature and impact, and has superior wear-resistance and enhanced durability. Therefore, the Surlyn resin is widely used for wrapping  
30 various kinds of confectionery, processed meats and frozen foodstuffs. And, the Surlyn resin has properties of being easily adhesive to metal, nylon, polyolefin, epoxy and urethane.

Respective cylinders 10, 20 and 30 discharge the molten synthetic resin, Surlyn resin and adhesives separately into a cylinder head 40, which is connected to  
35 discharging end portions of cylinders 10, 20 and 30. Then, the molten synthetic resin, Surlyn resin and adhesives in cylinder head 40 are separately flown into an

extruder 50, which is detachably coupled to cylinder head 40. Extruder 50 separates the molten synthetic resin, Surlyn resin and adhesives and discharges the same. The discharged molten synthetic resin, Surlyn resin and adhesives are adhered to each other at a predetermined position to form a multi-layer.

5 Describing more in detail, the molten synthetic resin forms an inside layer, the molten Surlyn resin forms an outside layer, and the molten adhesives is disposed between the molten synthetic resin and the molten Surlyn resin to bond them together. Such a bonded molten materials of synthetic resin, Surlyn resin and adhesives are extruded toward a molding device 60, shaped into a container having a multi-layered  
10 wall structure by a blowing process to be finally cooled.

As shown in Fig. 2, the molten synthetic resin, Surlyn resin and adhesives gathered in cylinder head 40 are supplied into extruder 50 through each supply line, and extruded separately from one another through extruder 50. Extruder 50 includes a spiral groove 52a formed around a first extruding rod 52, through which  
15 the molten synthetic resin flows down, a spiral groove 54a formed around a second extruding rod 54, through which the molten adhesives flows down, and a spiral groove 56a formed around a third extruding rod 56, through which the molten Surlyn resin flows down. The molten synthetic resin, adhesives and Surlyn resin flowing down along spiral grooves 52a, 54a and 56a of first to third extruding rods 52, 54 and  
20 56, respectively, are adhered to each other by passing through an extruding end portion of a die 58 which covers third extruding rod 56, in such a manner that the molten synthetic resin forms an inside layer, the molten Surlyn resin forms an outside layer, and the molten adhesives is disposed between the molten synthetic resin and the molten Surlyn resin to bond them together.

25 It is desirable to maintain the suitable extruding speed so that the molten synthetic resin, adhesives and Surlyn resin extruded along first to third extruding rods 52, 54 and 56 have a round-tubular shape in a cross-section and are distributed evenly.

The thickness of the bonded molten materials of synthetic resin, adhesives  
30 and Surlyn resin is adjusted by a thickness-control piece 60 which is mounted to a lower end of first extruding rod 52. Since the thickness adjusting technique is already well-known to those skilled in the art, the explanation thereof will be omitted. Finally, the bonded molten materials of synthetic resin, adhesives and Surlyn resin are extruded into the molding device, and shaped into a container having a multi-  
35 layered wall structure.

Referring to Fig. 3, a container 1, which is finally molded through the

manufacturing processes described above, has a multi-layered wall structure which includes an inside layer 2 made of the synthetic resin, an outside layer 3 made of the Surlyn resin, and an adhesives layer 4 disposed between inside layer 2 and outside layer 3 for bonding together. The synthetic resin forming inside layer 2 is opaque and has a predetermined color, and the Surlyn resin forming outside layer 3 is transparent, so that the color of the synthetic resin can be expressed to the exterior through transparent outside layer 3. Also, the Surlyn resin forming outside layer 3 provides the soft feeling to touch.

In the present invention, the diverse external appearance of container 1 can be offered by varying the color of the synthetic resin.

In addition, when an advertisement is displayed on the surface of transparent outside layer 3, a shadow is reflected on the opaque inside layer 2 since the container has a multi-layered configuration where the transparent outside layer 3 exists outside the opaque inside layer 2 with its predetermined thickness, thereby offering unusual advertising effectiveness distinguished over previous monotonous advertisements.

Also, the container 1 may be molded solid or soft as occasion demands, while the soft touch provided by the container 1 can be maintained, by adjusting diversely the thickness of inside layer 2 and outside layer 3 different from each other.

#### INDUSTRIAL APPLICABILITY

As described above in detail, the inventive container is made of Surlyn resin. Though the Surlyn resin has good characteristics, it has not been practically used due to the difficulty in melting it into a transparent material. However, the Surlyn resin melted into a transparent material constitutes the multi-layered wall of the container, by being adhered to the synthetic resin of PE or PP in the present invention. Therefore, the container according to the present invention can provide the container with lightness. Further, the container is light to handle, feels soft by the Surlyn resin, has a high durability, and offers ornamental beauty as a glass container.

Also, the multi-layered wall structure of the container can cut off ultraviolet and prevent oxygen transmission, so as to keep contents in a good condition.

The multi-layered container made of the synthetic resin and the Surlyn resin in accordance to the present invention may be manufactured into various containers such as the cosmetic containers.

While the present invention has been shown and described with respect to particular embodiments, it will be apparent to those skilled in the art that many



changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims. For example, containers with a wall composed of diverse numbers of layers can be manufactured by modifying the extruding structure of a cylinder and an extruder.

5           The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative, and not restrictive. The scope of the invention is, therefore, indicated by the appended claims, rather than by the foregoing description. All changes which come within the meaning and range of  
10       equivalency of the claims are to be embraced within their scope.

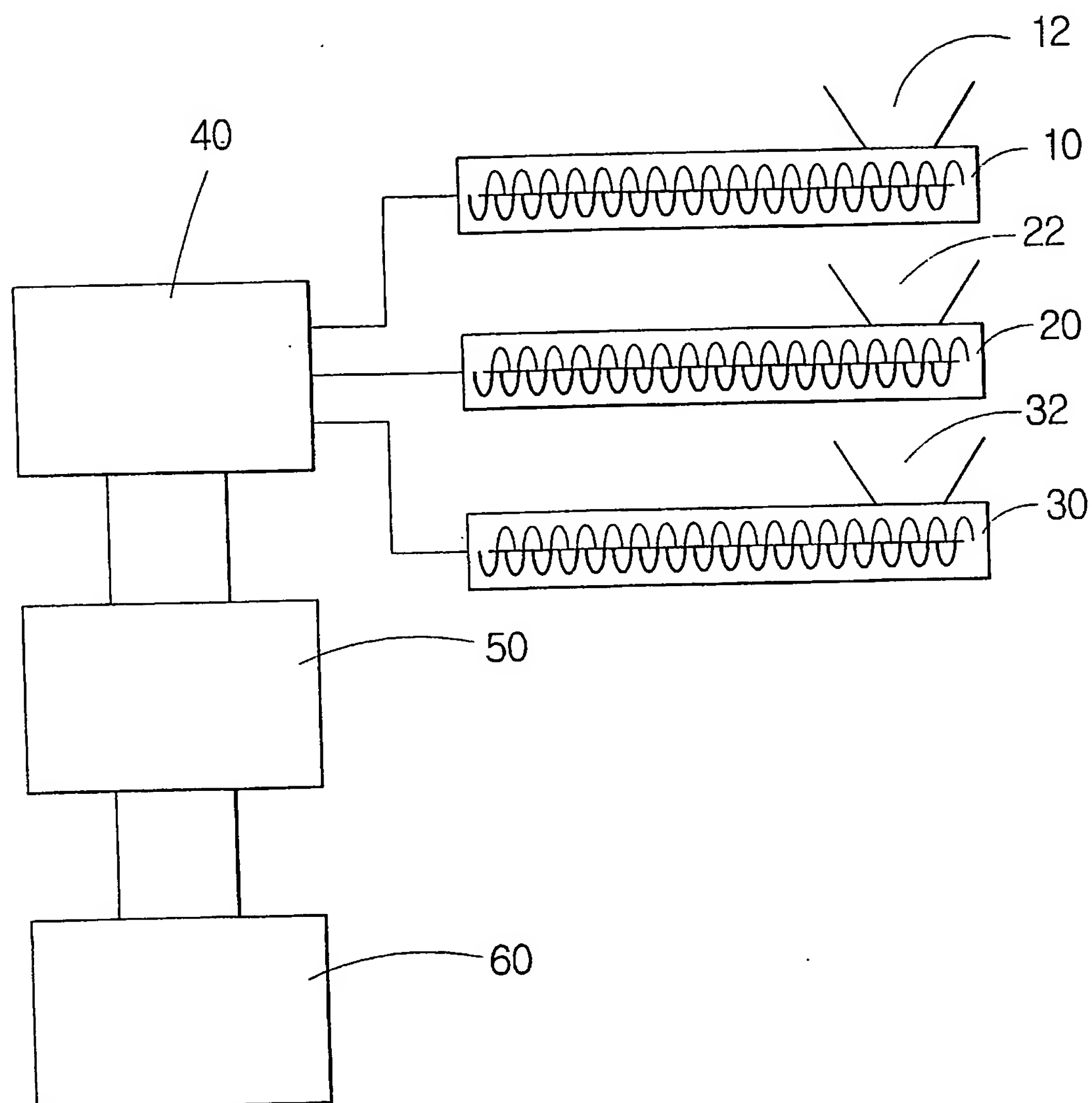
What is claimed is:

1. A container having a multi-layered wall structure, comprising:  
an inside layer which is made of a synthetic resin selected from the group  
5 consisting of polyethylene and polypropylene, which is opaque and has a  
predetermined color;  
an outside layer which is made of a non-crystalline transparent Surlyn resin;  
and  
an adhesives layer which is disposed between the inside layer and the  
10 outside layer for bonding them together.
2. A manufacturing method of a container having a multi-layered wall  
structure, comprising the steps of:  
melting raw materials for synthetic resin, Surlyn resin, and adhesives in  
15 each melting cylinder, and transforming the Surlyn resin to have non-crystalline and  
transparent features;  
supplying the molten synthetic resin, the Surlyn resin, and the adhesives  
separately from one another into a cylinder head and an extruder; and  
extruding the molten synthetic resin, the Surlyn resin, and the adhesives for  
20 forming a container, wherein the molten synthetic resin forms an inside layer of the  
container, the molten Surlyn resin forms an outside layer of the container, and an  
adhesives layer is disposed between the inside layer and the outside layer for bonding  
them together.
- 25 3. A manufacturing apparatus for a container having a multi-layered wall  
structure, comprising:  
cylinders with hoppers, through which raw materials for synthetic resin,  
selected from the group consisting of polyethylene and polypropylene, Surlyn resin  
and adhesives are supplied into the cylinders, heating means for melting the raw  
30 materials, and feeding means for discharging the molten materials;  
a cylinder head for gathering the molten synthetic resin, the Surlyn resin,  
and the adhesives discharged from the cylinders;  
an extruder which is mounted to the cylinder head, and includes a first  
extruding rod along which the molten synthetic resin flows down, a second extruding  
35 rod along which the molten adhesives flows down, a third extruding rod along which  
the molten Surlyn resin flows down, and a die for extruding the molten synthetic

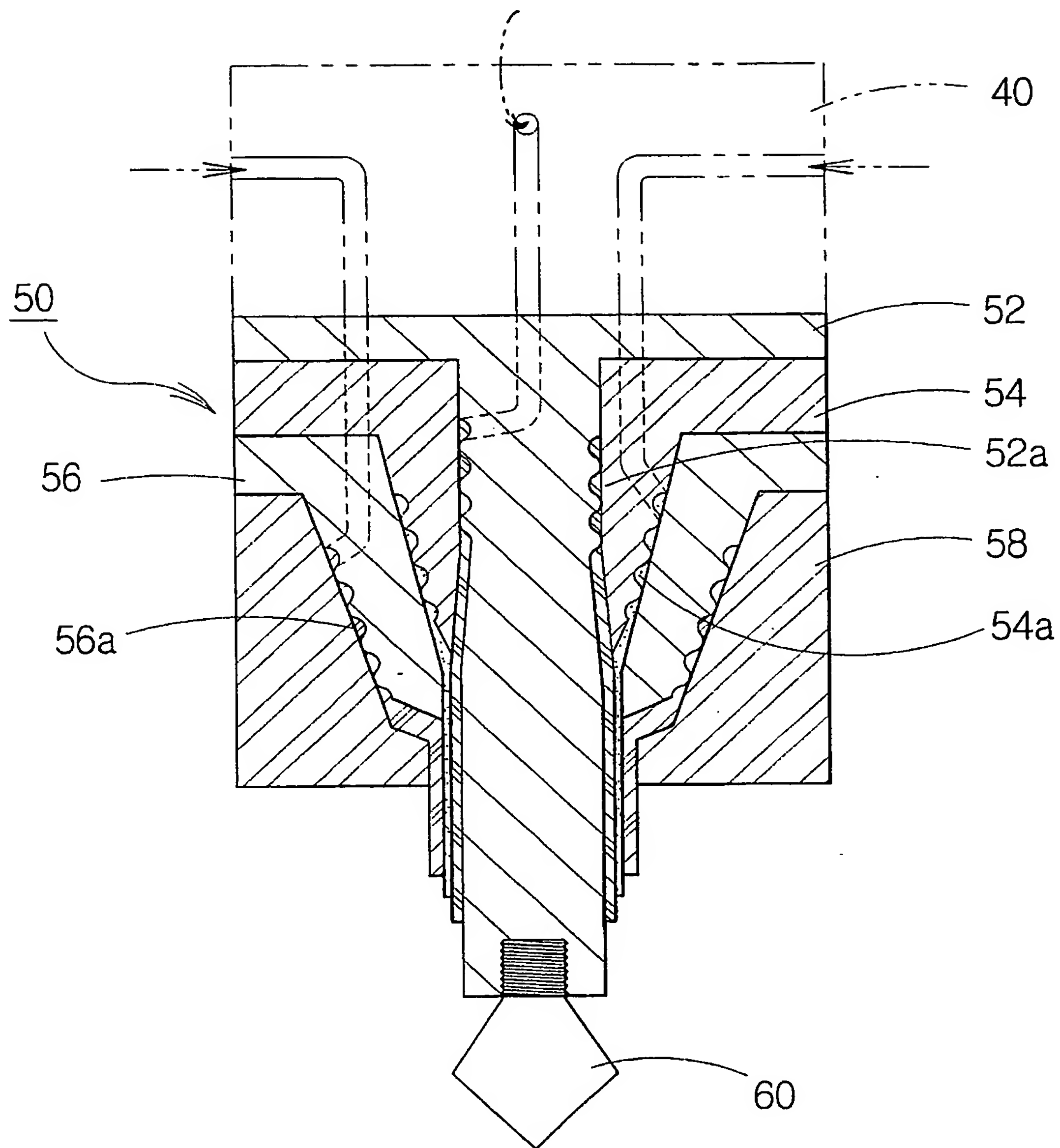
resin, adhesives and Surlyn resin such that the molten synthetic resin forms an inside layer, the molten Surlyn resin forms an outside layer and the molten adhesives is disposed between the molten synthetic resin and the molten Surlyn resin for bonding them together; and

- 5           a molding device which includes a blowing device for forming the container with a multi-layered wall structure composed of the synthetic resin, the adhesives, and the Surlyn resin extruded from the extruder.

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**Fig. 1**

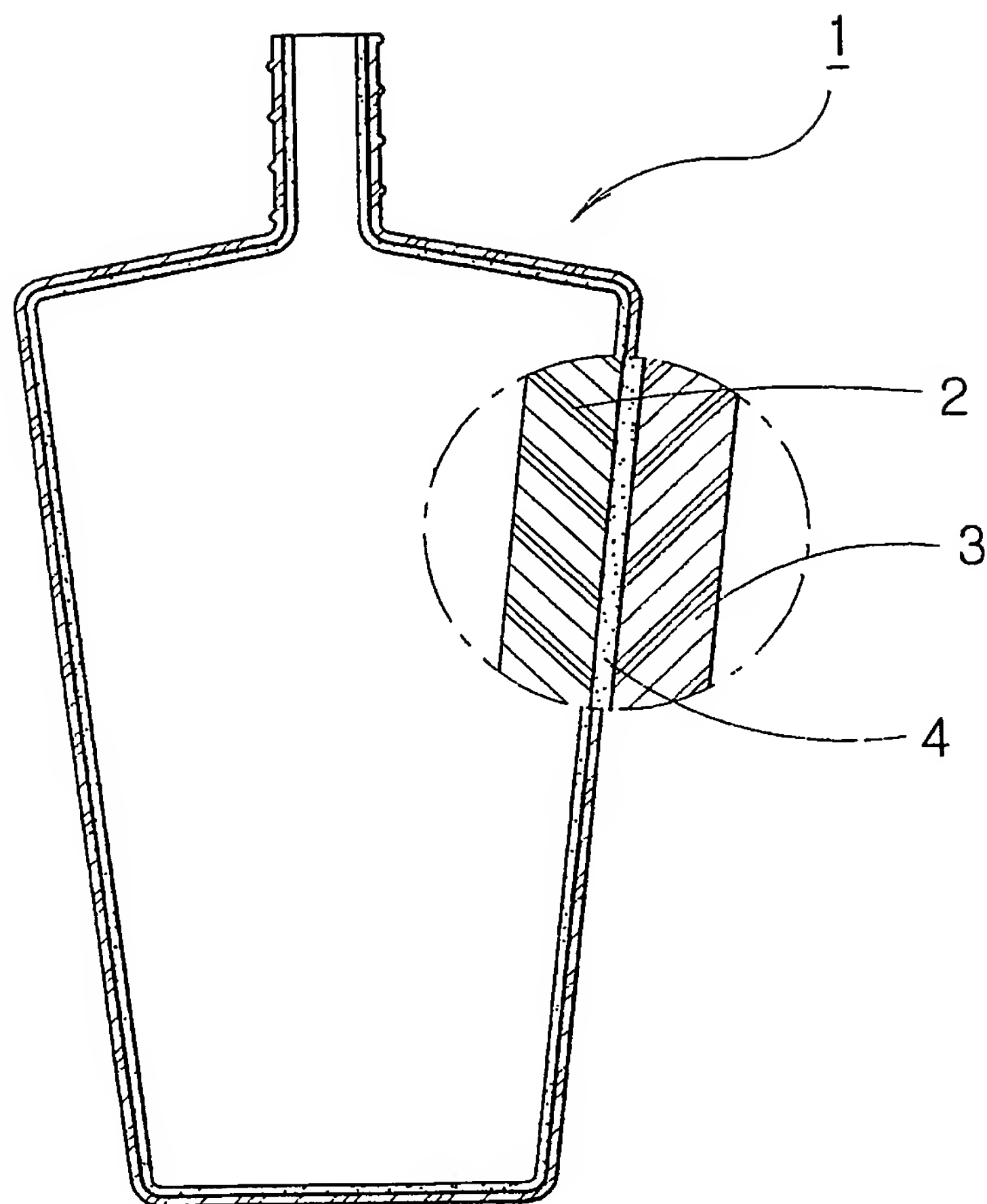
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**Fig. 2**



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**Fig. 3**



# INTERNATIONAL SEARCH REPORT

ational application No.  
PCT/KR03/00073

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7 B29C 47/00, 47/06, B29C 49/04, 49/22, B32B 27/00, 27/06, 27/08, 27/32, B65D 65/40

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 B29C 47/00, 47/06, B29C 49/04, 49/22, B32B 27/00, 27/06, 27/08, 27/32, B65D 65/40

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean patents and applications for inventions since 1975

Korean utility models and applications for utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	JP 7-9536 A (GENERAL ELECTRIC CO.) 13 January 1995 see claims; example(page 4 - page 7); Figs.1-3 -----	1-3
Y	EP 1,029,793 A1 (HANSHIN KASEI CO., LTD) 23 August 2000 see the whole document -----	1-3
Y	JP 60-157826 A (TOYO SEIKAN KAISHA LTD.) 19 August 1985 see the whole document -----	1-3
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:

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Authorized officer

LEE, Sun Kuk

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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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Information on patent family members

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